CLAIMS

1. A method to treat pain or hyperexcitability phenomena in an animal or human subject by administering an amount of GDNF that is effective to alter TTX-R Na^+ current flow through NaN sodium channels in DRG or trigeminal neurons.

2. The method of claim 1, wherein the sensory neuron is a DRG or trigeminal neuron.

3. A method to treat pain, paraesthesia or hyperexcitability phenomena in an animal or human subject by administering an effective amount of GDNF capable of at least partially restoring the normal balance between various types of TTX-R and TTX-S sodium channels in sensory neurons.

4. The method of claim 3, wherein the sensory neuron is a DRG or trigeminal neuron.

5. The method of claim 3 or 4, wherein the TTX-R sodium channels are selected from the group consisting of SNS/PN3 and NaN channels.

6. A method to treat pain, paraesthesia or hyperexcitability phenomena in an animal or human subject by administering an effective amount of an agent capable of modulating the transcription or translation of mRNA encoding sodium channels selected from the group consisting of SNS/PN3 and NaN channels.

7. The method of claim 6, wherein the agent is a neurotrophin.

8. The method of claim 6, wherein the neurotrophin is selected from the group

consisting of NGF and GDNF and or other members of their families.

9. The method of claim 6, wherein the agent modulates the production or activity of a neurotrophin that modulates the activity of the sodium channel.

10. The method of claim 9, wherein the agent modulates the level or activity of GDNF or NGF.

11. A method to treat pain, paraesthesia or hyperexcitability phenomena in an animal or human subject by administering an effective amount of an agent capable of altering the transcription or translation of mRNA encoding the NaN sodium channel.

12. A method of identifying an agent which modulates TTX-R Na^+ current through NaN channels comprising the step of:

determining whether the agent alters or modulates the expression of GDNF or at least one biological activity of GDNF.

13. The method of claim 10, wherein the agent modulates the GDNF induction of NaN.

14. A cell that has been transformed to express a functional recombinant GDNF receptor and, optionally, recombinant NaN.

15. A method to screen candidate compounds for use in treating pain and hyperexcitability phenomena comprising the steps of exposing the cell to the compound in the presence or absence of GDNF and determining the resultant level of expression or activity of the cell's Na^+ channels.

16. The method of claim 15, wherein the cell is the transformed cell of claim 12.

17. The method of claim 15, wherein the Na^+ channel is selected from the group consisting of the SNS/PN3 and NaN channels.

18. The method of claim 15, wherein the cell does not express SNS.

19. The method of claim 15, wherein the cell is present in a living animal.